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by

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on the invention entitled

SINGLE ACTION MOP WRINGER

assigned to

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SINGLE ACTION MOP WRINGER

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention generally relates to the field of mop wringers which are used to wring water out of a mop which has threads of yarn. More particularly, the present invention relates to the field of hand-operated mop wringers which are used to wring water out of yarn mops.

2. Description of the Prior Art

Mop wringers are used for wringing mops. The majority of mop wringers currently used in general households and ordinary businesses or institutions are hand operated. A hand-operated mop wringer is usually mounted on top of a small water bucket or basket. A user can rinse a mop in the water basket and then drain the mop with the mop wringer.

A conventional hand-operated mop wringer typically includes a housing which can be mounted on top of the small water basket. The housing supports two wringer plates. The two wringer plates are oppositely disposed and spring biased in a spaced apart relationship. Each wringer plate has a plurality of small apertures for draining the water. The housing further supports a mechanism which can drive the two wringer plates moving toward each other.

The driving mechanism can be operated through a wringer handle. The wringer handle is pivotably mounted at its lower end to the housing.

1 To drain a mop with the mop wringer, a user first places the mop between the two
2 wringer plates, then pushes down the upper end of the wringer handle. Each time the upper end
3 of the wringer handle is pressed, the two wringer plates will move towards each other and
4 squeeze the mop. When the upper end of the wringer handle is released the two wringer plates
5 will separate and the wringer handle swings back. The user can then remove the mop from the
6 wringer.

7
8 A significant disadvantage of mop wringers known in the prior art is that the
9 effectiveness of the conventional hand-operated mop wringer depends on the strength of the
10 user. To drain the mop more effectively, the user needs to push the wringer handle down harder.
11 How hard the wringer plates squeeze the mop depends on how hard the user pushes the wringer
12 handle. A user with less strength often has to repeat the operation several times as desired.
13 Furthermore, the user often needs to operate the wringer handle repeatedly to drain the mop as
14 desired.

15
16 These drawbacks of the conventional mop wringer are very undesirable for people with
17 less physical strength, especially elderly people. Even for people with normal strength, the
18 awkward and laborious operation of the mop wringer increases their fatigue very rapidly.

19
20 The present inventor Fred I. Morad attempted to address these issues by the creation of a
21 semi-automatic mop wringer which was disclosed and claimed in United States Patent 5,274,877
22 which issued on January 4, 1994. While the invention was a very fine innovation, the
23 complicated mechanism was expensive to produce and was not commercially viable.

24
25 Therefore, there is a significant need for improvements in mop wringers which address
26 the problems discussed above but at the same time is embodied in a simpler mechanical device
27 which will be commercially viable to manufacture and sell.
28

SUMMARY OF THE INVENTION

The present invention is a single action mop wringer which is formed of a housing having oppositely disposed sidewalls therein which have a pair of aligned spaced apart tracks in each sidewall which provide a guide for pins rollably supporting a pair of spaced apart rollers to come together at a desired distance to wring water from a mop on a single pass.

An activation means which can be a horizontal platform, yoke assembly or similar type of apparatus is movably connected to the pins supporting the rollers and a downward force on the handle incorporated into the activation means causing said rollers to move along the tracks.

A return spring will cause the activation means and the rollers to return to their original starting positions after the downward force on the handle is removed.

It is therefore an object of the present invention to provide a mop wringer where a single downward force causes rollers to come together at a desired distance so that the rollers will wring water out of mop strands placed between the rollers before they are caused to come together.

It is a further object of the present invention to provide a mop wringer which will wring water in a single pass without requiring multiple wringing operations.

It is a further object of the present invention to provide a mop wringer where only a minor force is required to cause the handle to move downwardly and activate the mop wringers to come together.

Further novel features and other objects of the present invention will become apparent from the following detailed description, discussion and the appended claims, taken in conjunction with the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Referring particularly to the drawings for the purpose of illustration only and not limitation, there is illustrated:

FIG. 1 is a perspective view of a first embodiment of the present invention single action mop wringer, shown resting on a bucket with the yarn mop held above the present invention;

FIG. 2 is an illustrative perspective view of the operating components of the first embodiment of the present invention single action mop wringer;

FIG. 3 is an exploded perspective view of the plate and arm holders of the first embodiment of the present invention;

FIG. 4 is an enlarged view of one of the arm holders of the first embodiment of the present invention;

FIG. 5 is an operational view of the first embodiment of the present invention showing the mop yarn inserted between the pair of rollers;

FIG. 6 is a second operational view of the first embodiment of the present invention showing the two rollers activated and caused to come together to squeeze water out of the mop yarn;

FIG. 7 is a third operational view of the first embodiment of the present invention showing the rollers returning to their original starting position after the water has been wrung out of the mop;

1 FIG. 8 is an illustrative perspective view of the operating components of a second
2 embodiment of the present invention single action mop wringer; and
3

4 FIG. 9 is an illustrative perspective view of the operating components of a third
5 embodiment of the present invention single action mop wringer.
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DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Although specific embodiments of the present invention will now be described with reference to the drawings, it should be understood that such embodiments are by way of example only and merely illustrative of but a small number of the many possible specific embodiments which can represent applications of the principles of the present invention. Various changes and modifications obvious to one skilled in the art to which the present invention pertains are deemed to be within the spirit, scope and contemplation of the present invention as further defined in the appended claims.

Referring to Figure 1, there is illustrated a perspective view of a first embodiment of the present invention single action mop wringer 10 which is resting on a rectangular conventional water bucket 200.

The water bucket 200 is comprised of four vertical walls, a front wall 202, a rear wall 204, a first sidewall 206 having a top edge 208 and a parallel spaced apart second sidewall 210 having a top edge 212. There is also a bottom 214. The bottom 214, front wall 202, rear wall 204, first sidewall 206 and second sidewall 210 surround an internal cavity 216 which can retain water. Preferably, the water bucket is rollable, and comprises a pair of parallel spaced apart front wheels of which one 218 is shown and a pair of parallel spaced apart rear wheels of which one 220 is shown.

Referring to Figures 1 and 2, there is shown the first embodiment of the present invention single action mop wringer 10 comprising a housing 12 and front wall 14 having a multiplicity of openings 16, a generally parallel and spaced apart rear wall 18 which may also have a multiplicity of openings (not shown), a first sidewall 20 and a parallel and spaced apart second sidewall 40. The first sidewall 20 comprises a first channel 22 having an arcuate upper section 24 and a vertically aligned second section 26 and a spaced apart second channel 28 having an

1 arcuate upper section 30 which is a mirror image of the upper section 24 and a vertically aligned
2 second section 32 which is spaced apart from and parallel to second section 26. Vertically
3 aligned second sections 26 and 32 are spaced apart by a distance "D". Second sidewall 40 has
4 channels which are parallel to and correspond with the channels in first section 20, only one of
5 which is shown. Second sidewall 40 comprises a first channel 42 having an arcuate upper
6 section 44 and a vertically aligned second section 46. Arcuate sections 24 and 44 are parallel
7 and aligned. Vertical sections 26 and 46 are also parallel and aligned. Second sidewall 40 also
8 has a second channel with an arcuate section which is a mirror image of the arcuate section 44
9 and a vertically aligned second section which is parallel to vertically aligned section 46 and
10 spaced apart therefrom by a distance "D". The arcuate section of the second channel in sidewall
11 40 is parallel and aligned with arcuate section 30. The vertically aligned section of the second
12 channel in sidewall 40 is parallel and aligned with vertical section 32.

13
14 The single action mop wringer 10 comprises a pair of spaced apart rollers which are used
15 to squeeze water from a mop. First roller 50 is supported on and rotates about a central pin 52
16 having a first end 54 and a second end 56. Second roller 60 is supported on central pin 62
17 having a first end 64 and a second end 66. Pin 52 extends through channels 22 and 42 and
18 travels along the channels. Pin 62 extends through channel 28 and the corresponding second
19 channel in second sidewall 40 and travels along the channels.

20
21 A horizontally aligned movable platform 70 is positioned adjacent first sidewall 20. In
22 the first embodiment of the present invention single action mop wringer 10, the movable
23 platform 70 is movably supported by a pair of pivotable arms. The movable platform 70 and
24 pivotable arms are shown in greater detail in Figures 3 and 4. The movable platform 70 has a
25 horizontal top surface 72. First arm 76 has an elongated shaft 78 terminating in a base 80 having
26 a pair of pins 81 and 82 which are rotatably supported in a first bracket 84 affixed to the top
27 surface 72 of movable platform 70 and located adjacent one end of the movable platform 70.
28 The bracket 84 has a first wall 86 with an opening 87 to rotatably accommodate pin 81 and a

second wall 88 with an opening 89 to rotatably accommodate pin 82. At its opposite end, elongated shaft 78 and first arm 76 terminate in a collar 90 having an opening 92. Second arm 96 also has an elongated shaft 98 terminating in a base 100 having a pair of pins 101 and 102 which are rotatably supporting second bracket 104 affixed to the top surface 72 of movable platform 70 and located at the end of platform 70 opposite from the location of first bracket 84. The second bracket 104 has a first wall 106 with an opening 107 to rotatably accommodate pin 101 and a second wall 108 with an opening 109 to rotatably accommodate pin 102. At its opposite end shaft 98 of second arm 96 terminates in a collar 110 having an opening 122. Brackets 84 and 104 are parallel to each other so that arms 76 and 96 will rotate in the same plane.

Referring to Figure 4, the first arm 76 is shown rotatably inserted into first bracket 84. It will be appreciated that second arm 96 is rotatably inserted into second bracket 104 in the same way.

Referring to Figures 1, 2 and 5, the movable platform 70 is supported in the following manner. The platform 70 as illustrated in Figures 1, 2, 5, 6 and 7 is rotated 180 degrees in the horizontal plane from the view illustrated in Figure 3. Collar 90 is rotatably affixed to central pin 52 by having opening 92 inserted through first end 54 of central pin 52 and retained thereon by conventional means such as a clip or cotter pin. Similarly, collar 110 is rotatably affixed to central pin 62 by having opening 112 inserted through first end 64 of central pin 62 and retained thereon by conventional means such as a clip or cotter pin.

A return spring 114 is affixed to the lower surface 74 of movable platform 70 and the return spring is supported at its opposite end by a spring base 116 affixed to first sidewall 20 adjacent its lower end. While only one return spring 114 is shown, it will be appreciated that a pair of return springs or any multiplicity of return springs can be incorporated into the present invention. When only one return spring 114 is used as illustrated in the figures, it is preferably

centrally positioned on lower surface 74 of movable platform 70.

Upper surface 72 of movable platform 70 also has a centrally positioned handle base 118 having internal threads 120. A platform handle 122 is comprised of an elongated shaft 124 having a grip member 126 at one end and mating threads at its lower end to be threaded into the handle base.

At the ends of the rollers 50 and 60 opposite to where the arms 76 and 96 are attached, the pins 52 and 62 are connected by a flexible tie bar having an internal spring so that the length of the tie bar can be varied. Referring to Figures 2 and 5, tie bar 130 has two shafts 132 and 134 which are connected at the interior ends by a collar 136 having an internal spring (not shown) to which each internal end of shafts 132 and 134 are connected. At its outer end, shaft 132 is rotatably connected to rear end 56 of pin 52 and at its outer end, shaft 134 is rotatably connected to rear end 66 of pin 62. The tie bar 130 is just outside second sidewall 40.

The operation of the first embodiment of the present invention single action mop wringer will now be described. Referring to Figures 1 through 7, initially, the housing 12 is placed onto the water bucket 200 as illustrated in Figure 1 so that the lower edges of sidewalls 20 and 40 respectively rest on the top edge 208 of first sidewall 206 and the top edge 212 of second sidewall 210 of water bucket 200.

The water bucket 200 may have its interior cavity 216 partially filled with water so that the mop 300 may have the mop strands 320 initially rinsed. The mop 300 comprises a handle 310 and strands 320 which are conventionally made of yarn or other fiber material. The mop 300 is then held above the mop ringer 10 as illustrated in Figure 1. To begin the operation the mop is inserted into the housing as illustrated in Figure 5 so that the mop strands 320 are below the pair of rollers 50 and 60 while the mop handle 310 is held above the rollers 50 and 60 so that it will not interfere with the operation of the rollers. With the other hand the grip member 126 of

1 the handle 122 is grasped and a downward force is placed on it so that the movable horizontal
2 platform 70 is caused to move downwardly. This downward action causes arm 76 to cause pin
3 52 to move along first channel 22 which serves as a track and simultaneously causes arm 96 to
4 cause pin 62 to move along second channel 28 which also serves as a track, and concurrently,
5 pin 52 moves along first channel 42 and pin 62 moves along the corresponding second channel
6 in second sidewall 40 so that the pins 52 and 62 move from the respective arcuate sections of the
7 channels to the vertical sections of the channels. This action causes the rollers 50 and 60 to
8 come together as illustrated in Figure 6 and rotatably travel down the length of the mop strands
9 320 to wring water 330 from the mop strands.

10
11 The distance "D" between the vertical sections of the channels is selected so that the
12 rollers 50 and 60 will be at a proper separation to properly wring water from the mop strands
13 320. As water 330 is wrung out of the mop strands, the water exits through openings 16 in
14 housing 12 and also fall through the open bottom of the housing 12 and into the interior chamber
15 216 of water bucket 200. As also illustrated in Figure 6, as the movable platform 70 is caused to
16 move downwardly, the tie bar 130 is compressed as the shafts 132 and 134 are compressed
17 together and compress the internal spring inside collar 136. Also, return spring 114 is
18 compressed as illustrated in Figure 6. After water 330 has been wrung from the mop strands 320
19 by the single downward motion, the downward force on the platform handle 122 is released.
20 The compressed return spring 114 then exerts an upward force as illustrated in Figure 7 to return
21 the horizontal platform 70 to its original position as illustrated in Figure 1 and the pins 52 and 62
22 respectively move along channels 22 and 28 to all return to their original position as illustrated
23 in Figure 1, thereby causing rollers 50 and 60 to separate, as illustrated in Figure 7. Since the
24 rollers 50 and 60 are positioned to completely wring the mop strands 320 dry after only one
25 downward pull, the present invention is far more efficient than prior art mop wringers. It is not
26 necessary to wring the mop over and over and no extra heavy force is required to squeeze the
27 mop strands 320 since the channels or tracks cause the rollers 50 and 60 to come together by the
28 predetermined distance "D" to fully wring the mop strands 320 dry on a single pass.

1 The second embodiment of the present invention single action mop wringer is illustrated
2 in Figure 8. The only variation from the first embodiment is the location of the return spring.
3 All of the other components are identical. In the second embodiment, the return spring 144 is
4 positioned above the platform 70. The return spring 144 has a housing 148 which is attached to
5 the first sidewall 20 at a location above the horizontal platform 70 and housing flat spring 146
6 which is attached to the horizontal platform 70 as illustrated in Figure 10. The return spring 144
7 operates like a retractable tape measure. As the platform is caused to move downwardly to cause
8 the rollers 50 and 60 to come together to wring the mop strands 320 dry in the manner
9 previously set forth, the spring 146 is stretched. After the mop strands 320 have been wrung dry,
10 the downward force on the platform handle 122 is released and the return spring force from
11 return spring 144 retracts the spring 146 back into housing 148 causing the horizontal platform
12 to return to its initial position, causing the pins 52 and 62 to move along a return path on the
13 channels 22, 28 42 and corresponding second channel in the second sidewall until the rollers 50
14 and 60 are returned to their spread apart starting position.

15
16 In the third embodiment, the horizontal platform is replaced with a yoke assembly as
17 illustrated in Figure 9. The yoke assembly 150 comprises a first generally Y-shaped member
18 having a first section 152 including a gap 154 and aligned openings 156 to receive a portion of
19 first arm 78 and a second section 162 including a gap 164 and aligned openings 166 to receive a
20 portion of second arm 98. The openings 156 in first section 152 can accommodate means to
21 rotatably support the arm 78 in the first section 152 which can be pins 81 and 82 as illustrated in
22 Figure 3 or a rivet. Similarly, the openings 166 in second section 162 can accommodate means
23 to rotatably support the arm 98 in the second section 162 which can be pins 101 and 102 as
24 illustrated in Figure 3 or a rivet. The opposite end of arm 78 is rotatably attached to pin 52 in the
25 same manner as illustrated in the previous figures and the opposite end of arm 98 is rotatably
26 attached to pin 62 in the same manner as illustrated in the previous figures. The yoke 150 is
27 attached to a base 168 which in turn is attached to a return spring 114 which in turn is attached to
28 a spring base 116 attached to the first sidewall 22 in the manner previously described.

1 Supported between first and second sections 152 and 162 of yoke assembly 150 is a
2 handle base 170 with receiving means such as internal threads to receive the handle 172 which
3 has an elongated shaft 174 and a grip member 176 at one end with the opposite end of the shaft
4 received within the handle base 170.

5
6 The operation is similar to the operation described for the first embodiment. A
7 downward force on handle 172 causes the yoke assembly 150 to move downwardly and the arms
8 78 and 98 cause pins 52 and 62 to move along tracks or channels 22 and 28 and the
9 corresponding channel 44 and other channel in second sidewall 40 until the rollers 50 and 60 are
10 brought together to squeeze water from the mop strands 320 and the return spring 114 is
11 compressed. After the mop strands are wrung dry, the downward force is released, the yoke 150
12 moves upwardly by the upward force of the return spring 114 to return the components to their
13 starting position.

14
15 All of the components of the present invention can be fabricated out of plastic,
16 polystyrene, other moldable materials or out of metal such as aluminum or steel.

17
18 Defined in detail, the present invention is a single action mop wringer, comprising: (a) a
19 housing including a front wall having a multiplicity of openings, a rear wall, a first sidewall
20 having a lower edge, an upper edge and a parallel oppositely disposed second sidewall having a
21 lower edge and upper edge, and an open top and open bottom; (b) a first channel formed into the
22 first sidewall, the first channel having a first arcuate section extending in one direction toward
23 the rear wall and adjacent the upper edge, and extending in the opposite direction to a first
24 vertically aligned second section terminating at a distance above the lower edge of the first
25 sidewall; (c) a second channel formed into the first sidewall, the second channel having a second
26 arcuate section extending in one direction toward the front wall and the upper edge, and
27 extending in the opposite direction to a second vertically aligned section terminating at a
28 distance above the lower edge of the first sidewall, the first vertically aligned second section and

1 the second vertically aligned second section being spaced apart and parallel to the one and
2 having the same vertical distance from their respective arcuate sections to the distance above the
3 lower edge of the first sidewall; (d) a first channel formed into the second sidewall, the first
4 channel in the second sidewall being the same shape as and parallel to the first channel formed
5 into the first sidewall, the first channel formed into the second sidewall having a corresponding
6 arcuate section and a corresponding vertical section; (e) a second channel formed into the second
7 sidewall, the second channel in the second sidewall being the same shape as and parallel to the
8 second channel formed into the first sidewall, the second channel formed into the second
9 sidewall having a corresponding arcuate section and a corresponding vertical section; (f) a first
10 roller rotatably supported on a pin and adjacent the upper edge of the first and second sidewalls,
11 the pin having a front end and extending through the first arcuate section of the first channel in
12 the first sidewall and a rear end extending through a first arcuate section in the first channel in
13 the second sidewall; (g) a second roller spaced from and parallel to the first roller, the second
14 roller rotatably supported on a pin and adjacent the upper edge of first and second sidewalls, the
15 pin having a front end extending through the second arcuate section of the second channel in the
16 first sidewall and a rear end extending through a second arcuate section in the second channel in
17 the second sidewall; (h) a horizontally aligned movable platform disposed adjacent the first
18 sidewall, the movable platform having a first bracket with an opening adjacent one of its ends
19 and a parallel oppositely disposed second bracket with an opening adjacent its opposite end; (i) a
20 first arm having an elongated shaft and with a base at one end having a pair of oppositely
21 disposed pins which are inserted in and rotatably supported by the opening in the first bracket
22 and a collar with an opening at the opposite end of the shaft, the opening of the collar inserted
23 onto the first end of the pin supporting the first roller; (j) a second arm having an elongated shaft
24 and a base at one end having a pair of oppositely disposed pins which are inserted in and
25 rotatably supported by the opening in the second bracket and a collar with an opening at the
26 opposite end of the shaft, the opening of the collar inserted onto the first end of the pin
27 supporting the second roller; (k) the movable platform having a centrally disposed handle base,
28 an elongated handle supported in the handle base at one end and having a grip member at its

1 opposite end; (l) a spring base affixed to the first sidewall adjacent its lower edge and a return
2 spring affixed between the spring base at one end and affixed to the horizontal platform and its
3 opposite end; and (m) a tie bar having a central collar with a spring therein, a first tie shaft
4 supported at one end of the spring and connected to the rear end of the pin supporting the first
5 roller at its opposite end, and a second tie shaft supported at the opposite end of the spring and
6 connected to the rear end of the pin supporting the second roller at its opposite end; (n) whereby,
7 the housing is positioned on a water bucket so that the lower edges of the first and second
8 sidewalls are adjacent the water bucket and the strands of a wet mop are positioned first above
9 the housing to a location between the rollers and a downward force on the handle causes the
10 movable platform to move downwardly which in turn causes the first and second arms to cause
11 the pins supporting the rollers to respectively move along the first and second channels in the
12 first sidewall where the tie bar causes the opposite ends of the pins supporting the rollers to
13 move along the first and second channels in the second sidewall, thereby causing the rollers to
14 come together and rollably move along the strands of the mop to wring water out of the mop, the
15 water going through the open bottom of this housing and through the openings in the front wall
16 into the water bucket, and when the downward force is released, the return spring causes the
17 movable platform, the rollers and their respective pins to return to their starting position.

18
19 Defined broadly, the present invention is a single action mop wringer, comprising: (a) a
20 housing including a front wall having a multiplicity of openings, a rear wall, a first sidewall
21 having a lower edge, an upper edge and a parallel oppositely disposed second sidewall having a
22 lower edge and an upper edge, and an open top and open bottom; (b) a first channel formed into
23 the first sidewall, the first channel having a first arcuate section extending in one direction
24 toward the rear wall and adjacent the upper edge, and extending in the opposite direction to a
25 first vertically aligned second section terminating at a distance above the lower edge of the first
26 sidewall; (c) a second channel formed into the first sidewall, the second channel having a second
27 arcuate section extending in one direction toward the front wall and the upper edge, and
28 extending in the opposite direction to a second vertically aligned section terminating at a

1 distance above the lower edge of the first sidewall, the first vertically aligned second section and
2 the second vertically aligned second section being spaced apart and parallel to the one and
3 having the same vertical distance from their respective arcuate sections to the distance above the
4 lower edge of the first sidewall; (d) a first channel formed into the second sidewall, the first
5 channel in the second sidewall being the same shape as and parallel to the first channel formed
6 into the first sidewall, the first channel formed into the second sidewall having a corresponding
7 arcuate section and a corresponding vertical section; (e) a second channel formed into the second
8 sidewall, the second channel in the second sidewall being the same shape as and parallel to the
9 second channel formed into the first sidewall, the second channel formed into the second
10 sidewall having a corresponding arcuate section and a corresponding vertical section; (f) a first
11 roller rotatably supported on a pin and adjacent the upper edge of the first and second sidewalls,
12 the pin having a front end and extending through the first arcuate section of the first channel in
13 the first sidewall and a rear end extending through a first arcuate section in the first channel in
14 the second sidewall; (g) a second roller spaced from and parallel to the first roller, the second
15 roller rotatably supported on a pin and adjacent the upper edge of first and second sidewalls, the
16 pin having a front end extending through the second arcuate section of the second channel in the
17 first sidewall and a rear end extending through a second arcuate section in the second channel in
18 the second sidewall; (h) a horizontally aligned movable platform disposed adjacent the first
19 sidewall, the movable platform having a first bracket with an opening adjacent one of its ends
20 and a parallel oppositely disposed second bracket with an opening adjacent its opposite end; (i) a
21 first arm having an elongated shaft and with a base at one end having a pair of oppositely
22 disposed pins which are inserted in and rotatably supported by the opening in the first bracket
23 and a collar with an opening at the opposite end of the shaft, the opening of the collar inserted
24 onto the first end of the pin supporting the first roller; (j) a second arm having an elongated shaft
25 and a base at one end having a pair of oppositely disposed pins which are inserted in and
26 rotatably supported by the opening in the second bracket and a collar with an opening at the
27 opposite end of the shaft, the opening of the collar inserted onto the first end of the pin
28 supporting the second roller; (k) the movable platform having a centrally disposed handle base,

1 an elongated handle supported in the handle base at one end and having a grip member at its
2 opposite end; (l) a return spring within a housing affixed to the first sidewall adjacent its upper
3 edge, the return spring affixed at one end to the horizontal platform; and (m) a tie bar having a
4 central collar with a spring therein, a first tie shaft supported at one end of the spring and
5 connected to the rear end of the pin supporting the first roller at its opposite end, and a second tie
6 shaft supported at the opposite end of the spring and connected to the rear end of the pin
7 supporting the second roller at its opposite end; (n) whereby, the housing is positioned on a
8 water bucket so that the lower edges of the first and second sidewalls are adjacent the water
9 bucket and the strands of a wet mop are positioned first above the housing to a location between
10 the rollers and a downward force on the handle causes the movable platform to move
11 downwardly which in turn causes the first and second arms to cause the pins supporting the
12 roller to respectively move along the first and second channels in the first sidewall where the tie
13 bar causes the opposite ends of the pins supporting the rollers to move along the first and second
14 channels in the second sidewall, thereby causing the rollers to come together and rollably move
15 along the strands of the mop to wring water out of the mop, the water going through the open
16 bottom of this housing and through the openings in the front wall into the water bucket, and
17 when the downward force is released, the return spring causes the movable platform, the rollers
18 and their respective pins to return to their starting position.

19
20 Defined more broadly, the present invention is a single action mop wringer, comprising:
21 (a) a housing including a front wall having a multiplicity of openings, a rear wall, a first sidewall
22 having a lower edge, an upper edge and a parallel oppositely disposed second sidewall having a
23 lower edge and an upper edge, and an open top and open bottom; (b) a first channel formed into
24 the first sidewall, the first channel having a first arcuate section extending in one direction
25 toward the rear wall and adjacent the upper edge, and extending in the opposite direction to a
26 first vertically aligned second section terminating at a distance above the lower edge of the first
27 sidewall; (c) a second channel formed into the first sidewall, the second channel having a second
28 arcuate section extending in one direction toward the front wall and the upper edge, and

1 extending in the opposite direction to a second vertically aligned section terminating at a
2 distance above the lower edge of the first sidewall, the first vertically aligned second section and
3 the second vertically aligned second section being spaced apart and parallel to the one and
4 having the same vertical distance from their respective arcuate sections to the distance above the
5 lower edge of the first sidewall; (d) a first channel formed into the second sidewall, the first
6 channel in the second sidewall being the same shape as and parallel to the first channel formed
7 into the first sidewall, the first channel formed into the second sidewall having a corresponding
8 arcuate section and a corresponding vertical section; (e) a second channel formed into the second
9 sidewall, the second channel in the second sidewall being the same shape as and parallel to the
10 second channel formed into the first sidewall, the second channel formed into the second
11 sidewall having a corresponding arcuate section and a corresponding vertical section; (f) a first
12 roller rotatably supported on a pin and adjacent the upper edge of the first and second sidewalls,
13 the pin having a front end and extending through the first arcuate section of the first channel in
14 the first sidewall and a rear end extending through a first arcuate section in the first channel in
15 the second sidewall; (g) a second roller spaced from and parallel to the first roller, the second
16 roller rotatably supported on a pin and adjacent the upper edge of first and second sidewalls, the
17 pin having a front end extending through the second arcuate section of the second channel in the
18 first sidewall and a rear end extending through a second arcuate section in the second channel in
19 the second sidewall; (h) a movable yoke assembly disposed adjacent the first sidewall, the yoke
20 assembly having a Y-shaped section composed of a first section having a pair of aligned walls, a
21 gap therebetween and a pair of aligned openings in the walls, a second oppositely disposed
22 section having a pair of aligned walls, a gap therebetween and a pair of aligned openings in the
23 walls, a base of the yoke forming the vertical portion of the Y, and a handle base disposed
24 between the first and second section; (i) a first arm having an elongated shaft and with a base at
25 one end having a pair of oppositely disposed pins which are inserted in and rotatably supported
26 by the openings in the first section of the yoke assembly and a collar with an opening at the
27 opposite end of the shaft, the opening of the collar inserted onto the first end of the pin
28 supporting the first roller; (j) a second arm having an elongated shaft and a base at one end

1 having a pair of oppositely disposed pins which are inserted in and rotatably supported by the
2 openings in the second section of the yoke assembly and a collar with an opening at the opposite
3 end of the shaft, the opening of the collar inserted onto the first end of the pin supporting the
4 second roller; (k) the movable yoke assembly having an elongated handle supported in the
5 handle base of the yoke assembly at one end and having a grip member at its opposite end; (l) a
6 spring base affixed to the first sidewall adjacent its lower edge and a return spring affixed
7 between the spring base at one end and affixed to the base of the yoke assembly at its opposite
8 end; and (m) a tie bar having a central collar with a spring therein, a first tie shaft supported at
9 one end of the spring and connected to the rear end of the pin supporting the first roller at its
10 opposite end, and a second tie shaft supported at the opposite end of the spring and connected to
11 the rear end of the pin supporting the second roller at its opposite end; (n) whereby, the housing
12 is positioned on a water bucket so that the lower edges of the first and second sidewalls are
13 adjacent the water bucket and the strands of a wet mop are positioned first above the housing to
14 a location between the rollers and a downward force on the handle causes the movable yoke
15 assembly to move downwardly which in turn causes the first and second arms to cause the pins
16 supporting the rollers to respectively move along the first and second channels in the first
17 sidewall where the tie bar causes the opposite ends of the pins supporting the rollers to move
18 along the first and second channels in the second sidewall, thereby causing the rollers to come
19 together and rollably move along the strands of the mop to wring water out of the mop, the water
20 going through the open bottom of this housing and through the openings in the front wall into the
21 water bucket, and when the downward force is released, the return spring causes the movable
22 yoke assembly, the rollers and their respective pins to return to their starting position.

23
24 Defined even more broadly, the present invention is a single action mop wringer,
25 comprising: (a) a housing including a front wall, a rear wall, a first sidewall having a lower edge,
26 an upper edge and a parallel oppositely disposed second sidewall having a lower edge and an
27 upper edge, and an open top and open bottom;
28 (b) a first channel formed into the first sidewall, the first channel having a first arcuate section

1 adjacent the upper edge, and extending in the opposite direction to a first vertically aligned
2 second section terminating at a distance above the lower edge of the first sidewall; (c) a second
3 channel formed into the first sidewall, the second channel having a second arcuate section
4 extending in one direction toward the front wall and the upper edge, and extending in the
5 opposite direction to a second vertically aligned section terminating at a distance above the
6 lower edge of the first sidewall, the first vertically aligned second section and the second
7 vertically aligned second section being spaced apart and parallel to the one and having the same
8 vertical distance from their respective arcuate sections to the distance above the lower edge of
9 the first sidewall; (d) a first channel formed into the second sidewall, the first channel in the
10 second sidewall being the same shape as and parallel to the first channel formed into the first
11 sidewall, the first channel formed into the second sidewall having a corresponding arcuate
12 section and a corresponding vertical section; (e) a second channel formed into the second
13 sidewall, the second channel in the second sidewall being the same shape as and parallel to the
14 second channel formed into the first sidewall, the second channel formed into the second
15 sidewall having a corresponding arcuate section and a corresponding vertical section;
16 (f) a first roller rotatably supported on a pin and adjacent the upper edge of the first and second
17 sidewalls, the pin having a front end and extending through the first arcuate section of the first
18 channel in the first sidewall and a rear end extending through a first arcuate section in the first
19 channel in the second sidewall; (g) a second roller spaced from and parallel to the first roller, the
20 second roller rotatably supported on a pin and adjacent the upper edge of first and second
21 sidewalls, the pin having a front end extending through the second arcuate section of the second
22 channel in the first sidewall and a rear end extending through a second arcuate section in the
23 second channel in the second sidewall; (h) a horizontally aligned movable platform disposed
24 adjacent the first sidewall, the movable platform having a first support means adjacent one end
25 and an oppositely disposed second support means at its opposite end; (i) a first arm having an
26 elongated shaft and with means at one end to be rotatably supported by the first means in the
27 platform and means at the opposite end of the shaft to be supported on the pin of the first roller;
28 (j) a second arm having an elongated shaft with means at one end to be rotatably supported by

1 the second support means in the platform and means at the opposite end of the shaft to be
2 supported on the pin of the second roller; (k) a handle supported on the movable platform;
3 (l) a spring base affixed to the first sidewall adjacent its lower edge and a return spring affixed
4 between the spring base at one end and affixed to the horizontal platform and its opposite end;
5 and (m) a tie bar having means to compressibly support a first shaft and a second shaft, the shafts
6 respectively connected to the rear end of the pin support of the first and second rollers; (n)
7 whereby, the housing is positioned on a water bucket so that the lower edges of the first and
8 second sidewalls are adjacent the water bucket and the strands of a wet mop are positioned first
9 above the housing to a location between the rollers and a downward force on the handle causes
10 the movable platform to move downwardly which in turn causes the first and second arms to
11 cause the pins supporting the rollers to respectively move along the first and second channels in
12 the first sidewall where the tie bar causes the opposite ends of the pins supporting the rollers to
13 move along the first and second channels in the second sidewall, thereby causing the rollers to
14 come together and rollably move along the strands of the mop to wring water out of the mop, the
15 water going through the open bottom of this housing and through the openings in the front wall
16 into the water bucket, and when the downward force is released, the return spring causes the
17 movable platform, the rollers and their respective pins to return to their starting position.

18
19 Defined even more broadly, the present invention is a single action mop wringer,
20 comprising: (a) a housing including a front wall, a rear wall, a first sidewall having a lower edge,
21 an upper edge and a parallel oppositely disposed second sidewall having a lower edge and an
22 upper edge, and an open top and open bottom; (b) a first channel formed into the first sidewall,
23 the first channel having a first arcuate section extending in one direction toward the rear wall and
24 adjacent the upper edge, and extending in the opposite direction to a first vertically aligned
25 second section terminating at a distance above the lower edge of the first sidewall; (c) a second
26 channel formed into the first sidewall, the second channel having a second arcuate section
27 extending in one direction toward the front wall and the upper edge, and extending in the
28 opposite direction to a second vertically aligned section terminating at a distance above the

1 lower edge of the first sidewall, the first vertically aligned second section and the second
2 vertically aligned second section being spaced apart and parallel to the one and having the same
3 vertical distance from their respective arcuate sections to the distance above the lower edge of
4 the first sidewall; (d) a first channel formed into the second sidewall, the first channel in the
5 second sidewall being the same shape as and parallel to the first channel formed into the first
6 sidewall, the first channel formed into the second sidewall having a corresponding arcuate
7 section and a corresponding vertical section; (e) a second channel formed into the second
8 sidewall, the second channel in the second sidewall being the same shape as and parallel to the
9 second channel formed into the first sidewall, the second channel formed into the second
10 sidewall having a corresponding arcuate section and a corresponding vertical section;
11 (f) a first roller rotatably supported on a pin and adjacent the upper edge of the first and second
12 sidewalls, the pin having a front end and extending through the first arcuate section of the first
13 channel in the first sidewall and a rear end extending through a first arcuate section in the first
14 channel in the second sidewall; (g) a second roller spaced from and parallel to the first roller, the
15 second roller rotatably supported on a pin and adjacent the upper edge of first and second
16 sidewalls, the pin having a front end extending through the second arcuate section of the second
17 channel in the first sidewall and a rear end extending through a second arcuate section in the
18 second channel in the second sidewall; (h) a horizontally aligned movable platform disposed
19 adjacent the first sidewall, the movable platform having a first support means adjacent one end
20 and an oppositely disposed second support means at its opposite end; (i) a first arm having an
21 elongated shaft and with means at one end to be rotatably supported by the first means in the
22 platform and means at the opposite end of the shaft to be supported on the pin of the first roller;
23 (j) a second arm having an elongated shaft with means at one end to be rotatably supported by
24 the second support means in the platform and means at the opposite end of the shaft to be
25 supported on the pin of the second roller; (k) a handle supported on the movable platform;
26 (l) a return spring within a housing affixed to the first sidewall adjacent its upper edge, the return
27 spring affixed at one end to the horizontal platform; and (m) a tie bar having means to
28 compressibly support a first shaft and a second shaft, the shafts respectively connected to the

1 rear end of the pin support of the first and second rollers; (n) whereby, the housing is positioned
2 on a water bucket so that the lower edges of the first and second sidewalls are adjacent the water
3 bucket and the strands of a wet mop are positioned first above the housing to a location between
4 the rollers and a downward force on the handle causes the movable platform to move
5 downwardly which in turn causes the first and second arms to cause the pins supporting the
6 rollers to respectively move along the first and second channels in the first sidewall where the tie
7 bar causes the opposite ends of the pins supporting the rollers to move along the first and second
8 channels in the second sidewall, thereby causing the rollers to come together and rollably move
9 along the strands of the mop to wring water out of the mop, the water going through the open
10 bottom of this housing and through the openings in the front wall into the water bucket, and
11 when the downward force is released, the return spring causes the movable platform, the rollers
12 and their respective pins to return to their starting position.

13
14 Defined even more broadly, the present invention is a single action mop wringer,
15 comprising: (a) a housing including a front wall, a rear wall, a first sidewall having a lower edge,
16 an upper edge and a parallel oppositely disposed second sidewall having a lower edge and an
17 upper edge, and an open top and open bottom; (b) a first channel formed into the first sidewall,
18 the first channel having a first arcuate section extending in one direction toward the rear wall and
19 adjacent the upper edge, and extending in the opposite direction to a first vertically aligned
20 second section terminating at a distance above the lower edge of the first sidewall; (c) a second
21 channel formed into the first sidewall, the second channel having a second arcuate section
22 extending in one direction toward the front wall and the upper edge, and extending in the
23 opposite direction to a second vertically aligned section terminating at a distance above the
24 lower edge of the first sidewall, the first vertically aligned second section and the second
25 vertically aligned second section being spaced apart and parallel to the one and having the same
26 vertical distance from their respective arcuate sections to the distance above the lower edge of
27 the first sidewall; (d) a first channel formed into the second sidewall, the first channel in the
28 second sidewall being the same shape as and parallel to the first channel formed into the first

1 sidewall, the first channel formed into the second sidewall having a corresponding arcuate
2 section and a corresponding vertical section; (e) a second channel formed into the second
3 sidewall, the second channel in the second sidewall being the same shape as and parallel to the
4 second channel formed into the first sidewall, the second channel formed into the second
5 sidewall having a corresponding arcuate section and a corresponding vertical section;
6 (f) a first roller rotatably supported on a pin and adjacent the upper edge of the first and second
7 sidewalls, the pin having a front end and extending through the first arcuate section of the first
8 channel in the first sidewall and a rear end extending through a first arcuate section in the first
9 channel in the second sidewall; (g) a second roller spaced from and parallel to the first roller, the
10 second roller rotatably supported on a pin and adjacent the upper edge of first and second
11 sidewalls, the pin having a front end extending through the second arcuate section of the second
12 channel in the first sidewall and a rear end extending through a second arcuate section in the
13 second channel in the second sidewall; (h) a movable yoke assembly disposed adjacent the first
14 sidewall, the yoke assembly having a Y-shaped section composed of a first section having a pair
15 of aligned walls, a gap therebetween and a pair of aligned openings in the walls, a second
16 oppositely disposed section having a pair of aligned walls, a gap therebetween and a pair of
17 aligned openings in the walls, a base of the yoke forming the vertical portion of the Y, and a
18 handle base disposed between the first and second section; (i) a first arm having an elongated
19 shaft and with means at one end to be rotatably supported by the openings in the first section of
20 the yoke assembly and means at the opposite end of the shaft to be supported on the pin of the
21 first roller; (j) a second arm having an elongated shaft with means at one end to be rotatably
22 supported by the openings in the second section of the yoke assembly and means at the opposite
23 end of the shaft to be supported on the pin of the second roller; (k) a handle supported on the
24 handle base of the yoke assembly; (l) a spring base affixed to the first sidewall adjacent its lower
25 edge and a return spring affixed between the spring base at one end and affixed to the base of the
26 yoke assembly and its opposite end; and (m) a tie bar having means to compressibly support a
27 first shaft and a second shaft, the shafts respectively connected to the rear end of the pin support
28 of the first and second rollers; (n) whereby, the housing is positioned on a water bucket so that

1 the lower edges of the first and second sidewalls are adjacent the water bucket and the strands of
2 a wet mop are positioned first above the housing to a location between the rollers and a
3 downward force on the handle causes the movable platform to move downwardly which in turn
4 causes the first and second arms to cause the pins supporting the rollers to respectively move
5 along the first and second channels in the first sidewall where the tie bar causes the opposite
6 ends of the pins supporting the rollers to move along the first and second channels in the second
7 sidewall, thereby causing the rollers to come together and rollably move along the strands of the
8 mop to wring water out of the mop, the water going through the open bottom of this housing and
9 through the openings in the front wall into the water bucket, and when the downward force is
10 released, the return spring causes the movable yoke assembly, the rollers and their respective
11 pins to return to their starting position.

12
13 Defined even more broadly, the present invention is a single action mop wringer
14 comprising: (a) a housing including at least a first sidewall having a lower edge and an upper
15 edge and a parallel oppositely disposed second sidewall having a lower edge and an upper edge
16 and an open top; (b) a first track formed into the first sidewall and a first track formed into the
17 second sidewall, the tracks being the same shape and parallel to one another; (c) a second track
18 formed into the first sidewall, the second track spaced apart from the first track and being a
19 mirror image of the first track; (d) a second track formed into the second sidewall, the second
20 track spaced apart from the first track and being a mirror image of the first track, the second
21 track being the same shape and parallel to the second track in the first sidewall; (e) a first roller
22 rotatably supported on a pin and adjacent the upper edge of the first and second sidewalls, the
23 pin having a front end extending through the first track in the first sidewall and a rear end
24 extending through the first track in the second sidewall; (f) a second roller rotatably supported on
25 a pin and adjacent the upper edge of the first and second sidewalls, the pin having a front end
26 extending through the second track in the first sidewall and a rear end extending through the
27 second track in the second sidewall; (g) the shape of the tracks formed so that the rollers are
28 spaced apart when at the location adjacent the top of the sidewalls such that when the rollers are

1 caused to move downwardly along the tracks, a portion of the tracks in the first sidewall being
2 vertically aligned and parallel to each other are spaced by a given distance and a portion of the
3 tracks in the second sidewall being vertically aligned and parallel to each other are separated by
4 the same distance as the distance between the vertically aligned portions of the tracks in the first
5 sidewall; (h) a horizontally aligned movable platform disposed adjacent the first sidewall and
6 having a handle supported thereon, and rotatable means to support the horizontal platform on the
7 front ends of the pin supporting the first roller and the pin supporting the second roller; (i) means
8 to movably interconnect the rear ends of the pin supporting the first roller and the pin supporting
9 the second roller; and (j) return spring means connected to the horizontally aligned movable
10 platform; (k) whereby, the housing is positioned on a water bucket so that the lower edges of the
11 first and second sidewalls are adjacent the water bucket and the strands of a wet mop are
12 positioned first above the housing to a location between the rollers and a downward force on the
13 handle causes the movable platform to move downwardly which in turn causes the rotatable
14 means which support the platform to cause the pins supporting the rollers to respectively move
15 along the first and second tracks in the first sidewall where the means to movably interconnect
16 the rear end of the pins causes the pins supporting the rollers to move along the first and second
17 tracks in the second sidewall, thereby causing the rollers to come together and rollably move
18 along the strands of the mop to wring water out of the mop, the water going through the housing
19 into the water bucket, and when the downward force is released, the return spring causes the
20 movable yoke assembly, the rollers and their respective pins to return to their starting position.

21
22 Defined even more broadly, the present invention is a single action mop wringer
23 comprising: (a) a housing including at least a first sidewall having a lower edge and an upper
24 edge and a parallel oppositely disposed second sidewall having a lower edge and an upper edge
25 and an open top; (b) a first track formed into the first sidewall and a first track formed into the
26 second sidewall, the tracks being the same shape and parallel to one another; (c) a second track
27 formed into the first sidewall, the second track spaced apart from the first track and being a
28 mirror image of the first track; (d) a second track formed into the second sidewall, the second

1 track spaced apart from the first track and being a mirror image of the first track, the second
2 track being the same shape and parallel to the second track in the first sidewall; (e) a first roller
3 rotatably supported on a pin and adjacent the upper edge of the first and second sidewalls, the
4 pin having a front end extending through the first track in the first sidewall and a rear end
5 extending through the first track in the second sidewall; (f) a second roller rotatably supported on
6 a pin and adjacent the upper edge of the first and second sidewalls, the pin having a front end
7 extending through the second track in the first sidewall and a rear end extending through the
8 second track in the second sidewall; (g) the shape of the tracks formed so that the rollers are
9 spaced apart when at the location adjacent the top of the sidewalls such that when the rollers are
10 caused to move downwardly along the tracks, a portion of the tracks in the first sidewall being
11 vertically aligned and parallel to each other are spaced by a given distance and a portion of the
12 tracks in the second sidewall being vertically aligned and parallel to each other are separated by
13 the same distance as the distance between the vertically aligned portions of the tracks in the first
14 sidewall; (h) a movable yoke assembly disposed adjacent the first sidewall, the yoke assembly
15 having a handle supported thereon and oppositely extending arms, rotatable means to support the
16 yoke assembly on the oppositely extending arms and also on the front ends of the pin supporting
17 the first roller and the pin supporting the second roller; (i) means to movably interconnect the
18 rear ends of the pin supporting the first roller and the in supporting the second roller, and (j)
19 return spring means connected to the movable yoke assembly; (k) whereby, the housing is
20 positioned on a water bucket so that the lower edges of the first and second sidewalls are
21 adjacent the water bucket and the strands of a wet mop are positioned first above the housing to
22 a location between the rollers and a downward force on the handle causes the yoke assembly to
23 move downwardly which in turn causes the rotatable means which support the yoke assembly to
24 cause the pins supporting the rollers to respectively move along the first and second tracks in the
25 first sidewall where the means to movably interconnect the rear end of the pins causes the pins
26 supporting the rollers to move along the first and second tracks in the second sidewall, thereby
27 causing the rollers to come together and rollably move along the strands of the mop to wring
28 water out of the mop, the water going through the housing into the water bucket, and when the

1 downward force is released, the return spring causes the movable yoke assembly, the rollers and
2 their respective pins to return to their starting position.

3
4 Defined even more broadly, the present invention is a single action mop wringer
5 comprising: (a) a housing including at least a first sidewall having a lower edge and an upper
6 edge and a parallel oppositely disposed second sidewall having a lower edge and an upper edge
7 and an open top; (b) a first track formed into the first sidewall and a first track formed into the
8 second sidewall, the tracks being the same shape and parallel to one another; (c) a second track
9 formed into the first sidewall, the second track spaced apart from the first track and being a
10 mirror image of the first track; (d) a second track formed into the second sidewall, the second
11 track spaced apart from the first track and being a mirror image of the first track, the second
12 track being the same shape and parallel to the second track in the first sidewall; (e) a first roller
13 rotatably supported on a pin and adjacent the upper edge of the first and second sidewalls, the
14 pin having a front end extending through the first track in the first sidewall and a rear end
15 extending through the first track in the second sidewall; (f) a second roller rotatably supported on
16 a pin and adjacent the upper edge of the first and second sidewalls, the pin having a front end
17 extending through the second track in the first sidewall and a rear end extending through the
18 second track in the second sidewall; (g) the shape of the tracks formed so that the rollers are
19 spaced apart when at the location adjacent the top of the sidewalls such that when the rollers are
20 caused to move downwardly along the tracks, a portion of the tracks in the first sidewall being
21 vertically aligned and parallel to each other are spaced by a given distance and a portion of the
22 tracks in the second sidewall being vertically aligned and parallel to each other are separated by
23 the same distance as the distance between the vertically aligned portions of the tracks in the first
24 sidewall; (h) activation means comprising a handle and oppositely disposed movable arms,
25 which respectively connect the activation means to the front end of the pin supporting the first
26 roller and the front end of the pin rotatably supporting the second roller;
27 (i) means to movably interconnect the rear ends of the pin supporting the first roller and the in
28 supporting the second roller, and (j) return spring means connected to the activation means;

(k) whereby, the housing is positioned on a water bucket so that the lower edges of the first and second sidewalls are adjacent the water bucket and the strands of a wet mop are positioned first above the housing to a location between the rollers and a downward force on the handle causes the activation means to move downwardly which in turn causes the movable arms to cause the pins supporting the rollers to respectively move along the first and second tracks in the first sidewall where the means to movably interconnect the rear end of the pins causes the pins supporting the rollers to move along the first and second tracks in the second sidewall, thereby causing the rollers to come together and rollably move along the strands of the mop to wring water out of the mop, the water going through the housing into the water bucket, and when the downward force is released, the return spring causes the activation means, the rollers and their respective pins to return to their starting position.

Of course the present invention is not intended to be restricted to any particular form or arrangement, or any specific embodiment, or any specific use, disclosed herein, since the same may be modified in various particulars or relations without departing from the spirit or scope of the claimed invention hereinabove shown and described of which the apparatus or method shown is intended only for illustration and disclosure of an operative embodiment and not to show all of the various forms or modifications in which this invention might be embodied or operated.

The present invention has been described in considerable detail in order to comply with the patent laws by providing full public disclosure of at least one of its forms. However, such detailed description is not intended in any way to limit the broad features or principles of the present invention, or the scope of the patent to be granted. Therefore, the invention is to be limited only by the scope of the appended claims.

WHAT IS CLAIMED IS: